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Full Name of Author — Nom complet de l'auteur

Glynis Griffiths

Date of Birth — Date de naissance	Country of Birth — Lieu de naissance
Jan. 26, 1958	Canada

Permanent Address — Résidence fixe

Box 595
Summerland B.C. V0H 1Z0

Title of Thesis — Titre de la thèse

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University of Alberta

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1981	Rick Alderman

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FOCUS OF ATTENTION AND FREE-THROW SHOOTING PERFORMANCE

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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PERMANENT ADDRESS:

11040 - 89 Ave.
Edmonton Alberta
T6G 0Z6

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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled FOCUS OF ATTENTION AND FREE-THROW SHOOTING PERFORMANCE

submitted by GLYNIS GRIFFITHS

in partial fulfillment of the requirements for the degree of Master of Arts in Physical Education.

Supervisor

Date December 10, 1981.

ABSTRACT

It is difficult to conceive a single situation in which an individual's ability to pay attention on certain things while ignoring others is not critical to effective performance (Nideffer, 1981). Robert Nideffer has developed a paper and pencil test (TAIS) to assess an individual's attentional style and interpersonal characteristics. The purpose of this study was to examine whether or not a relationship existed between the six TAIS attentional parameters and the free-throw shooting performance of female university basketball players. The TAIS was administered to 56 female basketball players in the Canada West University Athletic Association during the 1980-81 regular season. Subjects were ranked according to their free-throw shooting percentages for the season. The top and bottom 25 percent were classified as high and low groups. It was hypothesized in this study that the high percentage free-throw group would score higher on the TAIS scales of BET, BIT and NAR and lower on the scales of OET, OIT and RED. This would be opposite for the low percentage group. A t-test revealed significant differences between high and low performance groups on the OET ($p < .01$) and OIT ($p < .05$) scales. Scores on the BET, BIT, NAR and RED scales were not significantly different. Significant correlation coefficients ($p < .01$) were also obtained on the OET and OIT scale while the other four scales were not significant. On the basis of these results there appeared to be a relationship between free-throw shooting performance and the six attentional parameters in that; (1) a significant negative relationship was demonstrated between the overload scales (OET and OIT) and free-throw performance, (2) a moderate positive relationship and a moderate negative relationship existed between free-throw performance and the NAR and RED

constructs respectively, and (3) essentially no relationship existed between performance and a broad focus of attention (i.e., BET and BIT).

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CHAPTER I

INTRODUCTION

The ability to search for, select, and maintain a focus on the most relevant cues for the task at hand appears to be of vital importance in the performance of almost any physical activity or sport (Berlyne 1969, Murray 1974). The loss of concentration an athlete experiences is often due to a loss of control over her focus of attention. She is unable to eliminate all the distracting stimuli impinging on her while attempting to execute a skill. To assume that all the athlete need do is narrow her attention to the point where this distracting stimuli is no longer noticed is incorrect. The problem with this assumption is that the athlete may be in a situation requiring her to attend to a large number of cues.

To deal with this problem, attention cannot be viewed as operating along a single dimension. Robert Nideffer recognized that there are at least two dimensions of attention that are critical for effective performance. He states that at any time, a person's attention can be defined on the basis of both width and direction. The width dimension refers to a continuum along which attentional focus may vary from broad to narrow, while the directional dimension considers an internal and external focus. The two are seen as independent, though coexisting. Thus, an individual's attentional focus may be described along both dimensions as either broad external, broad internal, narrow external, or narrow internal in any particular situation.

Cratty (1973), Gallwey (1974), and Nideffer (1976) have all categorized the superior sports performer as one with an appropriate type of attention in the environment in which one performs one's skills. Thus, the competitive situation dictates in which dimension the athlete must be

operating if she is to respond appropriately. A broad external focus is required when the competitive situation is a complex and rapidly changing one. A narrow external focus is required for reacting to such external cues as the ball in tennis or baseball. When a player must analyze previous plays or past events in order to plan her next move a broad internal focus is required. A narrow internal focus would be appropriate when the player does not have to respond to rapid or sudden environmental changes. This type of reflection allows the player to analyze her feelings while performing.

While physical changes in the environment demand appropriate control of attention, an individual's perception may add meaning to a situation. The anxiety or competitive pressure a person feels is one of the main factors determining the nature of the situation. Therefore, the relationship between anxiety and attention must be considered (Nideffer 1976a). Nideffer (1976a, 1978, 1981) contends that the ability to maintain or develop a broad attentional focus in anxiety-inducing situations is reduced. As anxiety increases, attention begins to narrow involuntarily. As pressure increases, the ability to shift attention from one type of focus to another decreases. Finally, under these conditions attention becomes more internally focused.

To take into account both the individual and the situation, Robert Nideffer has attempted to use the interactionist approach in developing the "Test of Attentional and Interpersonal Style" (TAIS). The TAIS is a paper and pencil test containing 144 items. The first half of the test is comprised of items reflecting attentional competencies in a variety of life situations. These situations relate to one of three effective or ineffective attentional scales. The effective scales involve a broad external focus, a broad internal focus and a narrow focus. The ineffective

scales include an overload external focus, an overload internal focus and an underinclusive focus. The TAIS is a self-report assessment device requiring subjects to indicate the extent to which they manifest the behavior described in each situation along a five-point Likert scale ranging from "never" to "always".

Scores on each of the six attentional scales have been used by Nideffer to form a composite picture of the relative strengths and weaknesses of a person's attentional functioning. By defining the principal attentional requirements of various activities, one can predict how successful a person with a particular style of attentional focus will be. This, of course, assumes that the attentional style derived from the general life-situations of the TAIS will also be present in those activities for which the prediction is to be made.

Nideffer (1976b) recommends that assessment of attentional behavior should be from situations as specific as possible to the environment in which a prediction or analysis of performance is to be made. Even though the TAIS is not situation-specific, the test holds predictive validity (Nideffer 1976b). The nature of this thesis, is to examine the predictive utility of the TAIS in a sport-specific situation by exploring the relationship between the TAIS attentional parameters and the free-throw shooting performance of a selected group of female basketball players.

Statement of the Problem

The purpose of this study is to examine whether or not a relationship exists between selected attentional parameters and the free-throw shooting performance of female university basketball players.

Significance of the Problem

> A major potential advantage of the TAIS when compared with other psychological measures is that its test profile describes specific attentional and interpersonal characteristics. These characteristics are operationally defineable and they permit prediction of performance across a variety of life situations (Nideffer 1977).

A series of studies has substantiated the reliability of the TAIS (Nideffer 1976b). It has also been shown to have some construct and predictive validity, but as of yet, the measure has not been used to predict performance on an apriori basis. The TAIS must therefore be validated on empirical evidence rather than on theory to establish its practical application in the sport situation. Guilford (1978) notes:

> ... from this point of view a test is valid for any sphere of behavior if it enables us to forecast performance within that sphere, regardless of the name of the test or the trait or traits that it is said to measure.

Hypotheses

In order to examine these relationships, the following research hypotheses will be tested:

1) High percentage free-throw shooters are more likely to score lower than low percentage free-throw shooters on the following scales:

   a) external overload scale (OET)

   b) internal overload scale (OIT)

   c) reduced attention scale (RED)

2) High percentage free-throw shooters are more likely to score higher than low percentage free-throw shooters on the following scales:

   a) broad external scale (BET)

   b) broad internal scale (BIT)

   c) narrow attention scale (NAR)

Assumptions

The following will be assumptions of the study:

1) The subjects' proficiency in basketball is at a level in which the execution of a free-throw is performed effectively.

2) Free-throw shooting may be classified as a closed skill; as such, its execution requires a narrow attentional focus.

Delimitations

The scope of the study was delimited as follows:

1) Attentional styles were assessed with the use of Nideffer's "Test of Attentional and Interpersonal Style".

2) The subjects included six women's intercollegiate basketball teams from the universities of the Canada West University Athletic Association. These are: University of Saskatchewan, University of Alberta, University of Calgary, University of Lethbridge, University of British Columbia and the University of Victoria.

3) Only the first six scales on the TAIS were examined (BET, OET, BIT, OIT, NAR and RED).

4) The dependent variable selected for the study was free-throw shooting performance of the players during a game.

5) The independent variable selected for the study was the attentional style of the subjects as determined by the TAIS.

Limitations

The following will be limitations of the study:

1) Intact teams were used for the study and no attempt was made to select the teams at random.

2) Attention was only assessed along the dimensions of width and direction of focus by the TAIS.

3) The questionnaires are of a closed nature in that choices are provided to the respondent and a selection is made. Although the list of responses is assumed to include all possible relevant responses this may not be the case, causing possible responses to be overlooked.

4) All responses were accepted as given. As in any study involving the use of a questionnaire, the results will be relevant only if the questions are answered sincerely and honestly.

5) The investigator did not personally administer all of the questionnaires. The cooperation of the coaches was enlisted and detailed instructions were provided for administering the instrument and returning the responses.

6) The number of free-throws attempted by each player on a team will vary. Because it is impossible to control this variable, free-throw percentage was used as the criterion.

7) The results can only be generalized to female basketball players who are considered similar to the subjects used in this study.

Definition of Terms

Attention - attention is conceptualized on two dimensions: width - the amount of information one attends to; direction - whether the focus of attention is directed internally or externally.

Attentional style - the composite attentional strengths and weaknesses of an individual along the attentional dimensions of width and direction.

Effective attention - when the individual's attentional focus fits the attentional demands in a particular situation.

Ineffective attention - when the individual's attentional focus is inappropriate in a particular situation.

Broad external focus of attention - an effective type of attention in

which the individual's focus is on a range of environmental cues.

Overloaded external focus of attention - an ineffective type of attention in which the individual's focus is on a range of environmental cues.

Broad internal focus of attention - an effective type of attention in which the individual's focus is on a range of cognitive and proprioceptive stimuli.

Overloaded internal focus of attention - an ineffective type of attention in which the individual's focus is on a range of cognitive and proprioceptive stimuli.

Narrow focus of attention - an effective type of attention in which the individual's focus is directed towards selective and limited internal or external cues.

Underinclusive focus of attention - an ineffective type of attention in which the individual's focus is directed towards selective and limited internal or external cues.

Closed skill - performance situations that have a defineable beginning and ending and which are relatively the same each time (Marteniuk 1976).

Intercollegiate woman basketball player - a full-time university student who is a member of a competitive varsity basketball team sponsored by the institution.

Regular basketball season - the schedule of competitive basketball games played in which results become part of the season record. Exhibition games or tournaments and playoffs will not be included.

High percentage free-throw shooters - those players who achieve a free-throw shooting percentage of 71 or above during the 1980-81 regular season.

Low percentage free-throw shooters - those players who achieve a free-throw shooting percentage at or below 50 during the 1980-81 regular season.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents a review of literature in the area of attentional processes. It has been divided into four major sections. In the first section, a number of the more prominent attentional theories are discussed. The second section is concerned with attentional styles, while the third examines the relationship between attention and performance. The fourth section examines the evidence concerning the interaction between attention and anxiety. The final part of this chapter summarizes the preceding sections.

Attentional Theories

William James, one of the first modern experimental psychologists, defined attention in his book "The Principles of Psychology".

> Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, one out of what seems several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others (James 1890).

The first complete theory of attention was proposed by Donald Broadbent in 1958. In his filter theory, attention served as a mechanism whereby irrelevant stimuli were filtered by a pre-set criterion, perception occurring only after relevant sensory information passed the filter and obtained access to a central processing unit. Broadbent postulated selection of relevant from irrelevant material was made at the sensory level, thus inferring selection before processing.

The filter theory was discredited by results of studies which showed that subjects were capable of perceiving information on channels to which

they were not attending (Gray and Wedderburn 1960; Triesman 1960). The filter theory was slightly restructured by Treisman (1960) after studying the role of verbal and linguistic features on her subjects' ability to select one message from several. She suggested that incoming stimuli in an "unattended" message were not completely disregarded but were rather attenuated. By attenuating some channels, it reduced the load placed on the central processor while still allowing occasional signals on non-selected channels to sneak through when their meaning was relevant.

In summary, the filter-attenuation theory hypothesized that simultaneous inputs were not perceived unless they passed through a pre-set filter or had a low threshold for perception by nature of some relevance to the organism. If sensory information failed to pass the filter, it remained in short term store until the processing unit was clear. This implied that information could be stored in short term memory before it had been consciously perceived. When the processor was clear, the stored sensory information could then be processed and subsequently reach conscious awareness. As with Broadbent's model, this model suggested that attention must precede perception.

Deutsch and Deutsch (1963) proposed another explanation for the results of Treisman's studies. They suggested that selection took place only after meaningful components of all sensory signals had been extracted. They introduced a significance weighting system applied to incoming stimuli. Assuming that all inputs simultaneously reached the central processor, those stimuli deemed more significant, according to the individual's momentary intentions or habituated dispositions, were selected to be processed prior to the other less important stimuli. Norman (1969) proposed that momentary intentions and lasting dispositions determined pre-set weightings of significance associated with the parallel

activation of simultaneous inputs. These weightings were termed "pertinence". It was the combination of an input's pertinence with its sensory influence which determined which signals reached awareness and dominated perception and memory.

Neisser (1967) rejected the "negative" aspects of filtering and attenuation, contending that irrelevant stimuli were neither filtered out nor attenuated, but rather "fail to enjoy the benefits of analysis of synthesis". Neisser's hypothesis suggested that there was a passive system operating below consciousness which grouped and organized sensory data prior to any conscious attentive process. The salient characteristics of the stimuli were maintained by this passive processing in order to efficiently refocus attention if necessary. Neisser stated that selective attention preceded perceptual analysis and that this focused attention assumed conscious awareness. Hochberg (1970) has described the difference between perceptual analysis and conscious awareness. Awareness would only occur if what was perceived had an association stored in memory; these associations or expectations initiated the perceptual analysis. Any stimulus which was not matched to its prior expectation would be bypassed or forgotten unless it had a high "pertinence" level, as theorized in Neisser's model.

To summarize, pre-conscious processing determined the chosen stimuli, based on their level of pertinence (Neisser 1967) or their matching potential with a set of expectations in memory (Hochberg 1970).

The theories mentioned above are similar in the sense that they are structural models assuming attention to be a prerequisite to perception or awareness (Rouse 1980). "In other words, to selectively attend to a relevant signal has meant that sensory information, filtered, attenuated, synthesized or expected has been selected for processing which has allowed

for the perception of the selected signal to occur" (Frey 1975). It may be argued, however, that perception occurs prior to attention. Norman (1969) notes that there must be some perception of "irrelevant" information so that the person knows whether to switch attention or not. Keele (1973) has suggested that "the retrieval of information stored in memory and triggered by an external stimulus does not require attention. Subsequent operations, in contrast, are attention-demanding." Thus the processes subsequent to memory are mutually interfering. This theory postulated that simultaneous signals activated memory representations in parallel, and that mental operations were performed on such information at the sensory level, before memory activation, or at the actual level of memory activation. This implies that conscious awareness of sensory information (i.e., perception) was possible before attention was required or necessary. Posner and Mitchell (1967) also reported that subjects were capable of making perceptual judgements based solely upon sensory information, prior to any memory activation whatsoever. In other words, perception of stimulus events occurred prior to the locus where attention was required, that is, subsequent to memory retrieval.

In contrast to the structural models, capacity theories of attention are based on the intensity of the demands placed on the processing system. Emphasis is on the central processor and its limited capacity to deal with on-going tasks. Moray's (1967) theory viewed man's attentional behavior as a central processor of limited capacity which received, transformed and generated messages. Performance was limited not by the number of stimuli but by the number and complexity of the ways they were classified and analyzed. Similarly, Kahneman (1973) has proposed a theory of attention based upon effort. His model hypothesized

that a number of activities could be made to occur by an additional nonspecific input which was labeled "effort", "capacity" or "attention". As long as the capacity was not exceeded there would not be interference occurring during simultaneous processing.

Both structural and capacity models of attention have been reviewed. The structural models of Broadbent (1958), Triesman (1960), Deutsch and Deutsch (1963), Norman (1969), Neisser (1967), and Hochberg (1970) contended that attention was required before perception could occur. Keele (1973) and Posner and Mitchell's (1967) models suggested that attention was necessary only for processes subsequent to memory retrieval or response initiation. No interference is assumed for perception which involves processes occurring before these stages. The capacity models of Moray (1967) and Kahneman (1973) were reviewed and suggested that any or all tasks may be mutually interfering if available attention is exceeded. These models suggested that if attention was sufficiently biased to one signal there was no available capacity to process the other stimulus simultaneously.

Attentional Styles

Attentional behavior as an attentional style has its foundations within numerous cognitive control principles. Gardner and Long's (1962) scanning principle implied a distinctive patterning of attention. They noted that extensive scanning reflected deployment of attention over widespread segments of a stimulus field, while selective scanning concerned attention to individual segments of a stimulus field.

The control principle of field articulation and field dependence-independence according to Silverman (1964) implied a pattern of attention deployment in which attention was directed towards the most relevant

segments in an informational field. Witkin (1954) distinguished between two contrasting modes of perception: (1) field-independent; which indicated an ability to disregard the background and separate out the required figure, and (2) field-dependent; which indicated an inability to separate an item from its context because the whole pattern seemed to merge together. Jones (1970) speculated that there was a tendency for athletic participants to have a field-independent mode of perception. Barrell and Trippe (1975) found that the individual's categorized as highly skilled were more field dependent than individuals of medium ability.

Another control principle which the literature suggested had relevance to attentional behavior included the leveling-sharpening concept. This suggested that levelers had a rather limited capacity for concentration. Petrie (1960) identified three perceptual types; reducers, moderates and augmenters. She classified the reducer as one who tended to be tolerant of pain and reduced the sensations perceived; the augmenter was described as one who tended to be intolerant of pain and subjectively increased the sensations perceived. The moderate, resided between these two extremes. Eysenk's introversion-extroversion constructs have been related to Petrie's concepts (Ryan 1976). Augmenters and introverts were able to concentrate on their perceived amount of stimulation, while reducers and extraverts were unable to concentrate for extended periods, finding a need to gain extra stimulation from the environment. The locus of control principle suggested that internals were more likely than externals to perceive events as being contingent on their own behavior and therefore directed their attention inward.

Individual control principles were tested against certain behavioral groups and across various situations with little success. Therefore,

researchers have consolidated different groups of the above control principles in an attempt to define the term attentional style (Gardner et al. 1959). This has resulted in considerable variation in the operational definition of this construct.

Silverman (1964) discussed the attentional style of schizophrenics in terms of the scanning and field articulation control processes. The scanning control process referred to the extensiveness with which stimuli were sampled when attending to a sensory or perceptual field. The field articulation control process depicted attention to certain segments of the stimulus fields and inhibition of attention to other segments of these fields. In a later study, Silverman (1970) examined six differences based upon attention response parameters. The prototypic female attentional style was characterized by:

a) sensitivity to subtle social and nonsocial cues
b) distractibility
c) a "yielding" nonanalytic, nonrestructuring perceptual attitude
d) a receptivity to emotional and intuitive stimuli
e) a disposition to reduce the experienced intensity of strong stimulation

The prototypic male attentional style was characterized by:

a) a relative lack of sensitivity to subtle social and nonsocial cues
b) minimal distractibility
c) an inhibition of response to emotional and irrational inner stimuli
d) a "counteracting" analytic, restructuring perceptual attitude

e) a disposition to augment the experienced intensity of strong stimulation

Denney (1974) defined a child's attentional style as "... the ability to deploy attention selectively thereby avoiding distraction from intrusive and irrelevant stimulus information." This was derived from the earlier constricted-flexibility control dimension which suggested that a more flexible person would be less distracted by irrelevant stimuli.

Wachtel (1967) considered an attentional style in terms of breadth of focus. He equated the width of attention to a beam of light in which the central brilliant part represented the focus surrounded by a less intensive fringe. Only the items in the focus of attention were distinctly perceived. Thus, scanning was a measure of how much the beam moved around the field, while focusing referred to the width of the beam.

> The major phenomena which the beam-width analogy is meant to distinguish from scanning phenomena are those of integration of the objects of attention, expressing the degree to which an individual can bring various factors to bear on each other and can use them simultaneously to weave together a more complete and balanced picture of his inner and outer world (Wachtel 1967).

The importance of a directional dimension was briefly discussed. "Focusing is not only upon external stimuli but upon internal processes as well" (Wachtel 1967).

While Silverman (1964), Denney (1974) and Wachtel (1967) used combinations of various control principles to formulate breadth dimensions of attentional style, others recognized the directional dimension of attentional style. They considered an internal-external dimension as a source of inter- and intra-individual differences, referring to it as perceptual style.

Pelletier (1974) recognized several perceptual styles and then noted their attentional characteristics. He suggested that ego-close and field-dependent individuals paid attention to the immediate external environment, being particularly receptive to external stimuli. The ego-distant and field-independent individuals tended to be detached from the external environment and were more aware of internal stimuli. He also noted that transcendental meditation had the effect of altering the "attentional style" of individuals from an external to an internal focus.

Heilbrun (1977) discussed attentional style in terms of breadth of scanning behavior. In his studies, he found a relationship between open and closed perceptual styles and internal/external scanning behavior. He argued that "the sheer economy of attention deployment would suggest that a perceptual style that oriented the person's attention toward external cues would detract from internal scanning to some extent" (Heilbrun 1972). Therefore the close-style male, whose perceptual style reduced the breadth of his attention to external cues, demonstrated broader internal scanning, while the open-style male tended to be a narrow internal scanner.

Nideffer (1976b) was the first to recognize attentional style in terms of both a breadth of focus dimension and a direction of focus dimension, coexisting and yet independent. He based his theory on research on highly effective people and on individuals suffering from various psychological disturbances, such as schizophrenia. He cited several theoretical studies as background for his work; Shakow (1962), Cromwell (1968) and Easterbrook's cue utilization theory (1959).

Nideffer developed a test to determine an athlete's attentional style. In constructing this instrument, he recognized the need for an assessment device to take into account (1) the athlete's personal factors,

(2) the demands of the situation, and (3) the interactional occurrences between the athlete and the competitive situation.

To delineate the relevant personal factors, Nideffer (1981) indicated that "athletic situations typically require an individual to make obvious use of both mental and physical abilities." The athlete must possess or acquire certain physical skills for effective performance. "The mental factors that seem critical to performance, and to the effective differentiation of arousal, involve the ability to attend to, and process, task relevant information" (Nideffer 1980). Three aspects of concentration influence effective performance: the width of focus, direction or attentional focus and the ability to alter positions on either or both dimensions as required (Nideffer 1976a).

Width of attention referred to how much information an individual attended to, within a given time frame. This implied the existence of a continuum extending from broad to narrow. An extremely narrow focus resulted in a filtering out of irrelevant information or reducing the range of cues, while a broad focus resulted in an increase in the range of cue utilization (Easterbrook 1959). The second dimension, direction of focus, referred to whether the athlete was attending to internal cues (thoughts and feelings) or external cues (environmental stimuli). An individual's attentional style was referred to as the configuration on the two dimensional space of attentional width and direction (Rouse 1980).

Nideffer (1981) notes that individuals tend to have preferred attentional styles. This is not the only factor influencing performance though, the attentional demands of the sport will influence how comfortable the athlete feels in the situation. If a narrow internal focus of attention is contrary to the athlete's dominant attentional style, impairment of performance may occur when the situation requires this

type of concentration. The compatability between the athlete's attentional abilities and the attentional demands of the competitive situation will reveal an athlete's strengths and weaknesses in attentional style. The interaction of these two aspects, the person and the situation, implies that an individual must be able to shift from one type of focus to another in order to perform effectively.

This section examined the concept of attentional style. It is based upon a number of cognitive control principles such as: the field dependence-independence principle, the leveling-sharpening concept, the concept of reducers and augmenters and introversion-extroversion constructs. Silverman (1964), Denney (1974) and Wachtel (1967) used combinations of various control principles to formulate breadth dimensions of attentional style. Pelletier (1974) and Heilbrun (1972) recognized the directional dimensions of attentional style. Nideffer (1976a) was the first to recognize attentional style in terms of both a breadth of focus dimension and a direction of focus dimension.

Attention and Performance

"It is difficult to conceive a single situation in which an individual's ability to pay attention and concentrate on certain things while ignoring others is not critical to effective performance" (Nideffer 1981). Much of the research done in the area of attention and performance is based on work done with schizophrenics. Nideffer (1981) notes that "It is disturbances in normal attentional processes that have been used to explain everything from schizophrenia to altered states of consciousness" (Nideffer 1981). Broen (1966), Gardner et al. (1959), and Silverman (1964) all noted that schizophrenics tended to be extreme on measures of scanning and field articulation in ways consistent with the kind of

schizophrenia they exhibited. Paranoid schizophrenics tended to show extensive scanning and high field articulation, whereas simple schizophrenics evidenced extremely minimal scanning and minimal field articulation. Payne (1966) suggested that fifty percent of schizophrenics had problems of overinclusion. Cromwell (1963) proposed a continuum of schizophrenic types ranging from overinclusive to withdrawn. The "overinclusive" types accepted extensive external stimulus input and also exercised their thought processes extensively, while the "withdrawn" had a "high base line redundancy level" or narrow focus of attention for both external and internal stimulation. Research of this type has limited predictive validity but has been useful in the development of theoretical attentional constructs available for assessing attentional competencies and inabilities in a broader range of situations (Taylor 1979).

Nideffer (1976b) has used the ineffective attentional constructs of overinclusion and withdrawal to define behavioral tendencies at each end on the breadth dimension. He also recognized a directional dimension defined as overinclusion of external or internal stimuli. From these constructs Nideffer has suggested six different aspects of attentional behavior; three involving effective control of attention and three concerned with ineffective control of attention. The former were designated as a broad external focus (BET), a broad internal focus (BIT), and a narrow internal and external focus (NAR). The latter were labeled as an overloaded external focus (OET), an overloaded internal focus (OIT), and an underinclusive internal and external focus (RED).

Based on the elevation of one scale relative to another, which Nideffer (1976a) noted was more important than comparison to norms, he

distinguished between an effective and ineffective attentional profile. Poor attenders scored higher on the scales of OET, OIT and RED than they did on the scales of BET, BIT and NAR. These people could not narrow their attention in order to avoid becoming overloaded and confused when presented with a large number of stimuli. Also when the situation required it, they were unable to shift attention from an internal to external focus, or vice versa (Nideffer 1976a). The opposite was true for optimal attenders.

"In talking about the role of attention in performance, it is necessary not only to think about an athlete's ability to develop certain types of attention but about the attentional demands of the specific athletic situation" (Nideffer 1981). Cratty (1973) and Gallwey (1976) all described sport situations in which an appropriate focus of attention and concentration was essential. Consequently, if a person's attentional state matched environmental demands, the person would function with maximum effectiveness. On the other hand, if attention was inappropriate, mistakes would occur and performance would suffer. Thus, in terms of predicting an individual's general level of effectiveness, Nideffer (1976) saw two factors as important: (1) the person's flexibility and control over width and direction of attention, and (2) the demand for flexibility in a particular environment.

In order to identify the attentional demands of a particular situation, Poulton (1957) classified skills as either open or closed based on the type of environment they were performed in. Closed skills were those performed in environments where critical cues were static or fixed, whereas open skills were those performed in environments where the conditions were continually changing positions in space. He also indicated that a closed skill depended on internal feedback, that is,

the kinesthetic feedback from the execution of the skill. There are no external requirements; rather, concern is for the body's operation in a fixed environment. Marteniuk (1976) noted that in closed skills, there was not the stress of time involved in perceiving the environment and deciding what plan of action to select that there was in open skills. In a closed skill, it was the output or effector aspect which is of primary importance. Information from the external environment assumed a minor role (Jones 1972). Marteniuk also indicated that the main difference between these two types of skills lies in the effector mechanism. He notes "... whereas in an open skill flexibility and diversification of execution are desirable, a closed skill demands exact replication of a successful movement pattern" (Marteniuk 1976).

A free-throw shot in basketball is considered a closed skill and so has certain attentional demands that are consistent from one situation to another. Gentile (1972) summarized the major implications for attention while performing a closed skill.

> When the individual is moving in a stationary environment, there is little time stress upon his selection and execution of a motor plan. He can predict with very high certainty the exact nature of the regulatory events that will be effective during his execution of the movement. On successive repetitions of the response, conditions in the environment that control his movement will remain relatively unchanged. Thus the performer can establish a highly consistent, narrowly defined motor pattern that yields the highest degree of goal-attainment.

Marteniuk (1976) also indicated that the major emphasis in the execution of a closed skill was the availability in memory of a well-organized plan of action that would exactly meet the demands of the environment.

Nideffer (1976a) indicated that a narrow external focus was ideal in those situations where optimal performance required total concentration

on a particular point or object. In accordance with Gentile and Marteniuk, he suggested that this particular attentional focus was useful when one responded to very few cues and if the physical behavior, once initiated, could continue without modification. "For example, once a golf swing is initiated, it becomes an unconscious, automatic process" (Nideffer 1976a). The external direction of behavior also keeps an athlete from becoming distracted by her own internal thoughts, feelings, and fears.

Gallwey (1976) suggested a similar focus although he applied it to both open and closed skills. He suggested focusing the mind on something actual rather than focusing on internal feelings and judgements. Runninger (1975) suggested that the smaller the target of visual concentration, the more accurate the resultant performance. Terauds (1975) examined the eye movements of accurate and inaccurate shooters during a set shot in basketball. The eye movements of the accurate shooters were systematic, with fixation on the front center portion of the rim before release. The fixation point remained the same until the ball reached the basket. The eye movements of the inaccurate shooters were sporadic. Mawson (1970) recommended that the free-throw shooter focus on the front of the rim, while Scalon (1968) recommended aiming at the back of the rim. Bunn (1962) and Gillespie (1965) emphasized over shooting, using the backboard as the point of reference. Although a consensus has not been reached as to the exact point of focus, all agree that one's concentration should be directed externally to a single reference point.

This section has dealt with attention as it relates to athletic performance. Much of the work done in this area is based on the observation of schizophrenics and other subnormal populations in various situations. Based on the attentional style of the athlete and the

attentional demands of the situation, Nideffer has distinguished between an effective and ineffective attentional focus. If an athlete's attentional state matches environmental demands, the person will function with maximum effectiveness. A free-throw is performed in a relatively static environment; as such, the attentional demands remain quite consistent from one attempt to the next. Gentile (1972), Poulton (1957) and Marteniuk (1976) suggested that in a closed skill the performer established a highly consistent, narrowly defined motor pattern. Execution of the closed skill required the performer to retrieve from memory the motor pattern or plan of action. Nideffer noted that the type of attentional focus required in this situation was a narrow external focus. This is supported by a number of prominent basketball coaches.

Attention and Anxiety

Nideffer (1976a) recommended that mere assessment of an attentional style and the attentional demands of a situation was not enough to predict how an individual would perform. Consideration of anxiety and arousal levels must also be made as these are natural components of most athletic competitions and have a direct effect on attentional processes.

Before discussing the relationship between anxiety and attention, it is necessary to differentiate between stress, anxiety and arousal. Nideffer (1976a) has operationally defined these terms and their relationship to one another. Stress refers to an external condition that can cause increases in an athlete's physiological level of arousal. Arousal is defined as the physiological changes that take place in response to stress. Anxiety refers to the psychological-emotional changes in response to stress.

> Under controlled conditions all three of these terms exist in a perfectly predictable relationship to each other; that is, stressful conditions always lead to an increase in arousal (physiological changes) and an increase in anxiety (physiological-emotional changes) (Nideffer 1976a).

Nideffer goes on to note that "most often situations we expect to be stressful elicit increases in both anxiety and arousal." Because anxiety and arousal go together much of the time he uses the terms interchangeably.

A number of theories have been examined to explain the effects of anxiety and arousal on performance. One of the first was the "drive" theory which suggested the existence of a linear relationship between performance and arousal levels. It supported the notion that increased arousal resulted in improved performance. Rainer Martens (1971), however, found fault with the notion that drive theory could satisfactorily explain complex motor behavior.

The activation theory proposed by Yerkes and Dodson (1908) led to the acceptance of an inverted-U relationship between arousal and performance. This theory hypothesized that for every type of behavior there exists an optimal degree of arousal, usually of moderate intensity, that produces maximum performance. Levels of arousal below or above this optimum amount are seen to produce inferior performances. A number of studies supported this hypothesis. Rainer Martens and Daniel Landers (1970) tested the inverted-U theory, using motor performance data and obtained typically U-shaped performance curves. Easterbrook (1959) noted that increases in arousal resulted in a reduction in the range of cues utilized. Initially the reduction in range of cue utilization reduced the proportion of irrelevant cues employed and so improved performance. When all irrelevant cues had been excluded, further reduction in the

number of cues employed affected the relevant cues and so proficiency fell. This suggested an optimal level of arousal for effective performance.

Landers (1978) noted that there are additional factors which mediate the relationship between arousal and performance. Task demands and situational characteristics modify the arousal-performance relationship. The evidence suggested that the optimal level of arousal was lower for more difficult tasks than for easy tasks. In terms of situational characteristics, Ahart (1973) reported that free-throw shooting performance was related to score differential at the time the shots were taken. Shooting percentages were higher when the score differential was moderate and lower when the score was close or when the differential was great.

Individual differences in susceptibility to arousal have been frequently observed. Eysenck (1976) has proposed two personality dimensions that have a direct bearing on the inherent arousal level of individuals and how susceptible the individual is to increases in arousal. He postulated that extraverts had stronger nervous systems which had higher stimulus intensity thresholds. Thus, the extravert was able to handle higher levels of arousal before her performance deteriorated. The opposite was true for introverts. Carrow (1965) concluded that in tasks of low difficulty, high anxious subjects were found to be superior to low anxious subjects. However, in tasks of high difficulty, low anxious subjects proved superior.

Oxendine (1970) offered the following generalizations on the arousal-performance relationship:

1) A high level of arousal is essential for optimal performance in gross motor activities involving strength, endurance and speed.

2) A high level of arousal interferes with performances involving complex skills, fine muscle movements,

coordination, steadiness, and general concentration.

3) A slightly above-average level of arousal is preferable to a normal or subnormal arousal state for all motor tasks.

Based on the research regarding arousal and performance, Nideffer suggested that there were generally three responses to increases in anxiety and arousal:

1) There was initially a breakdown in the ability to shift from one type of attention to another. This occurred because the athlete started to rely on his/her dominant attentional style.

2) Attention began to involuntarily narrow as arousal levels increased. This reduced the amount of information an athlete could deal with.

3) Finally, attention became more internally focused.

Nideffer's assumptions are supported by a number of researchers. Fenz (1967) stated that a strategy for shifting attention especially from internal to external may be particularly helpful in some stressful performances and may reduce arousal from high to optimal levels. Easterbrook (1959) formulated certain hypotheses regarding the narrowing of cue utilization following arousal. He suggested that peripheral cues were increasingly ignored with greater arousal, while central cues were augmented until even they were reduced with more extreme arousal. Bacon (1974) noted that research has found that arousal will tend to narrow the range of cues processed by systematically reducing responsiveness to those aspects of the situation that attract a lesser degree of attentional focus. Wine (1971) reviewed research which revealed that high test anxious subjects turned their attention inwards towards a self-evaluative and decision making rumination particularly in stressful conditions; while low anxious persons focused more fully on the task cues.

This section examined the effects of anxiety and arousal on attention. Arousal referred to the physiological changes in response to stress while anxiety referred to the psychological-emotional changes. Yerkes and Dodson's inverted-U hypothesis provided the groundwork for the relationship between arousal and performance. A number of mediating factors which have a direct effect on this relationship were then identified; task difficulty, situational characteristics and individual differences. Nideffer, after examining the relationship between arousal and performance, was able to draw certain implications regarding its influence on attention. He suggested that as anxiety and arousal increased, the ability to shift from one type of attention to another was impaired; attention began to narrow involuntarily and was directed internally.

Summary

"It is hard to imagine a variable more central to performance than the ability to direct and control one's attention" (Nideffer 1976b). The volumes of attentional literature reviewed by Berlyne (1969) and Murray (1974) would seem to support this statement. To examine the role of attentional processes, this review dealt with the following topics: theories of attention, attentional styles, attention and performance and attention and anxiety.

Two processing system models were identified from the various attentional theories. The structural models were concerned with the arrangement and interrelation of all the components of the system (Broadbent 1959; Treisman 1962). The capability, potentiality and maximum producing ability underlie the capacity models (Kahneman 1973; Moray 1967).

Nideffer (1981) indicated that "the sport psychologist in attempting to predict and control an athlete's behavior must be able to assess the athlete's attentional abilities and the attentional demands of the sport environment." While Denney (1974), Heilbrun (1972), Pelletier (1974), Silverman (1964) and Watchel (1967) recognized the attentional constructs adopted by Nideffer, Nideffer was the first to recognize attentional style in terms of both a breadth of focus and direction of focus. If a person's attentional state matches environmental demands, the person will function with maximum effectiveness. On the other hand, if attention is inappropriate, mistakes will occur and performance will suffer.

"Anxiety and arousal are natural components of most atlehtic competitions and have a direct effect on attentional processes" (Nideffer 1976a). As anxiety and arousal increase, the ability to shift from one type of attention to another is impaired; attention involuntarily narrows and becomes internally directed.

CHAPTER III

METHODS AND PROCEDURES

Sample

The subjects involved in this study (n = 56) were female intercollegiate basketball players in the Canada West University Athletic Association. There were ten subjects from the University of Victoria, ten from the University of Calgary, eleven from the University of Alberta, eleven from the University of Lethbridge, eleven from the University of Saskatchewan and three from the University of British Columbia. The number of years played at the intercollegiate level ranged from one to five. To gain a measure of reliability for the testing instrument, a stratified random subsample of twenty subjects was selected.

Test Description

The TAIS was constructed in an attempt to develop a rationale and valid assessment instrument for determining an individual's attentional style. Robert Nideffer identified different aspects of attentional and interpersonal behavior. He then developed a pool of unambiguous items reflecting behavioral experiences in 17 areas considered important for predicting performance and making specific treatment recommendations (Nideffer 1976b).

Of the 17 TAIS variables, six reflect attentional processes, two reflect behavioral and cognitive control and nine describe interpersonal style. As indicated previously, only the attentional scales were considered in this study. The test consists of 52 situations relating to attentional processes, randomly located within the first 78 items of the test. The statements relate to attentional behavior across a variety

of life situations. Three types of effective attentional behavior and three ineffective types are reflected in the situations. These are broad external focus (BET), broad internal focus (BIT), narrow focus (NAR), overloaded external focus (OET), overloaded internal focus (OIT) and under-inclusive focus (RED). While some of the situations represent more than one of the six scales, six situations are pertinent to the BET focus, eight to the BIT, twelve to the NAR, twelve to the OET, nine to the OIT and fifteen to the RED focus of attention. Subjects are required to rate each situation for the frequency of occurrence on a 5-point continuum ranging from "never" to "always".

The TAIS is hand scored through the use of 18 scoring keys. The scores are then placed on their respective scales on the TAIS profile sheet (see Figures 1 and 2). The position of the scale scores has already been established based on the test results from a group of college students. Norms for each scale were derived from this population. An individual's score is placed on the established scales. The scores were derived as both "z" and "t" scores.

Nideffer (1976b, 1977) reports some construct validity for the TAIS. He notes that there is very little overlap among tests designed to measure similar attentional constructs to those of the TAIS. Correlations between TAIS subscales and other psychological measures (MMPI, California F Scale, etc.) indicate some construct validity for the following attentional scales: BET, OIT and RED. Some predictive validity has also been identified for the attentional scales. Correlations of $r = .59$ to $r = .80$ are reported between the attentional scales and actual behavior measures of swimmers (Nideffer 1976b). Test-retest reliability coefficients for all the 17 TAIS scales range from .60 to .93 (Nideffer 1976b).

Data Collection Procedure

The data for this study was collected during the first half of the 1980-81 CWUAA regular basketball season. The head coach of each team was contacted prior to the first game in the series of games at the University of Alberta. At this time, the coach was presented with a letter explaining the research project. Once consent was given, the coach was given a packet which contained the following: copies of the "Test of Attentional and Interpersonal Style", answer sheets, one copy of "Questionnaire Instructions" and twelve pencils.

The questionnaire was administered to each member of the team by their coach on the day before the second game in the weekend series. The exact time was determined by each coach. To assure acceptable objectivity in the administration of the test, a written statement of directions was read to the subjects by each person giving the test. At this time the subjects were assured that their names would not be used in any way throughout the study. The completed questionnaires were obtained from the coach after the second game in the series.

The only exception to this procedure involved the University of Alberta Panda Basketball team. The TAIS was administered to this team just prior to the start of the 1980-81 season, after a two hour practice. The same format was followed for administering the test.

Statistical Treatment

To estimate the reliability of the "Test of Attentional and Interpersonal Style", a split-half correlation was calculated for each of the six attentional scales using the Spearman Brown formula (Ferguson 1976). A stratified random subsample of twenty was used for this purpose.

The 56 subjects were ranked according to their free-throw shooting

percentages for the 1980-81 regular season. To establish a high and low group for the criterion variable of free-throw shooting, the top and bottom twenty-five percent were taken. The high group consisted of 14 subjects with a free-throw shooting percentage of 71 or better, while the low group consisted of 14 subjects with a free-throw percentage of 50 or below.

To test the hypotheses, two statistical measurements were used: (1) First, a t-test was calculated between the mean scores on each of the six attentional scales for the high and low groups. The statistical hypothesis being tested was Ho: $\mu_1 - \mu_2 = 0$; thus, there will be no difference between groups. (2) To investigate the predictive utility of the TAIS, a correlational approach was utilized. A correlation coefficient between free-throw shooting performance and the TAIS attentional scales was calculated. The statistical hypothesis being tested was Ho: $p = 0$; thus there will be no relationship. All calculations were done on the AMDAHL 470 V/6 computer.

CHAPTER IV

RESULTS AND DISCUSSION

RESULTS

Introduction

The central purpose of this study was to explore the strong conceptual possibility that the attentional abilities of athletes underlie and/or are directly related to performance in their particular sports. The model chosen for determining an athlete's attentional abilities was that of Nideffer (1976), in which information is obtained from six (6) scales representing effectiveness of attention on the dimensions of breadth and direction. In order to narrow the focus of this study, athletic performance was defined as the ability to shoot free-throws during a league basketball game. Thus, an attempt was made to determine whether or not attentional focus (as described by scores on Nideffer's TAIS) was related to free-throw shooting ability.

The results are organized as follows:

1) Reliability coefficients of the test group on the six attentional TAIS scales.
2) Descriptive data showing the scores of the total group on the TAIS and their overall free-throw shooting percentage during the season in actual games.
3) Descriptive data organized to test the hypotheses explored in the study.
4) Correlation data organized to test the hypotheses explored in the study.

Reliability of Coefficients

A split-half method was utilized to establish the reliability of the six attentional scales on the TAIS. The Spearman-Brown formula was applied to each scale to obtain a reliability coefficient for the entire scale. Neale (1980) notes that this correlation provides an indication of internal consistency. "The investigator may reasonably conclude that the items on the test reflect or measure the same thing or have similar content" (Neale 1980).

The reliability coefficients are presented in Table 1. The coefficients ranged from a high of $r = 0.82$ for the BIT scale to a low of $r = 0.577$ for the OET scale. All correlations were significant at the .01 level.

Descriptive Data on Total Group

The TAIS scores of this group are shown in Figure 1 on a normal TAIS profile sheet. As can be seen, they cluster around the 50th percentile of the normative group of psychology students used by Nideffer (1976). Generally speaking, the group profile shown here could be speculated as not being a particularly effective attentional profile (i.e., OET is higher than BET and OIT is higher than BIT) except that NAR is higher than RED.

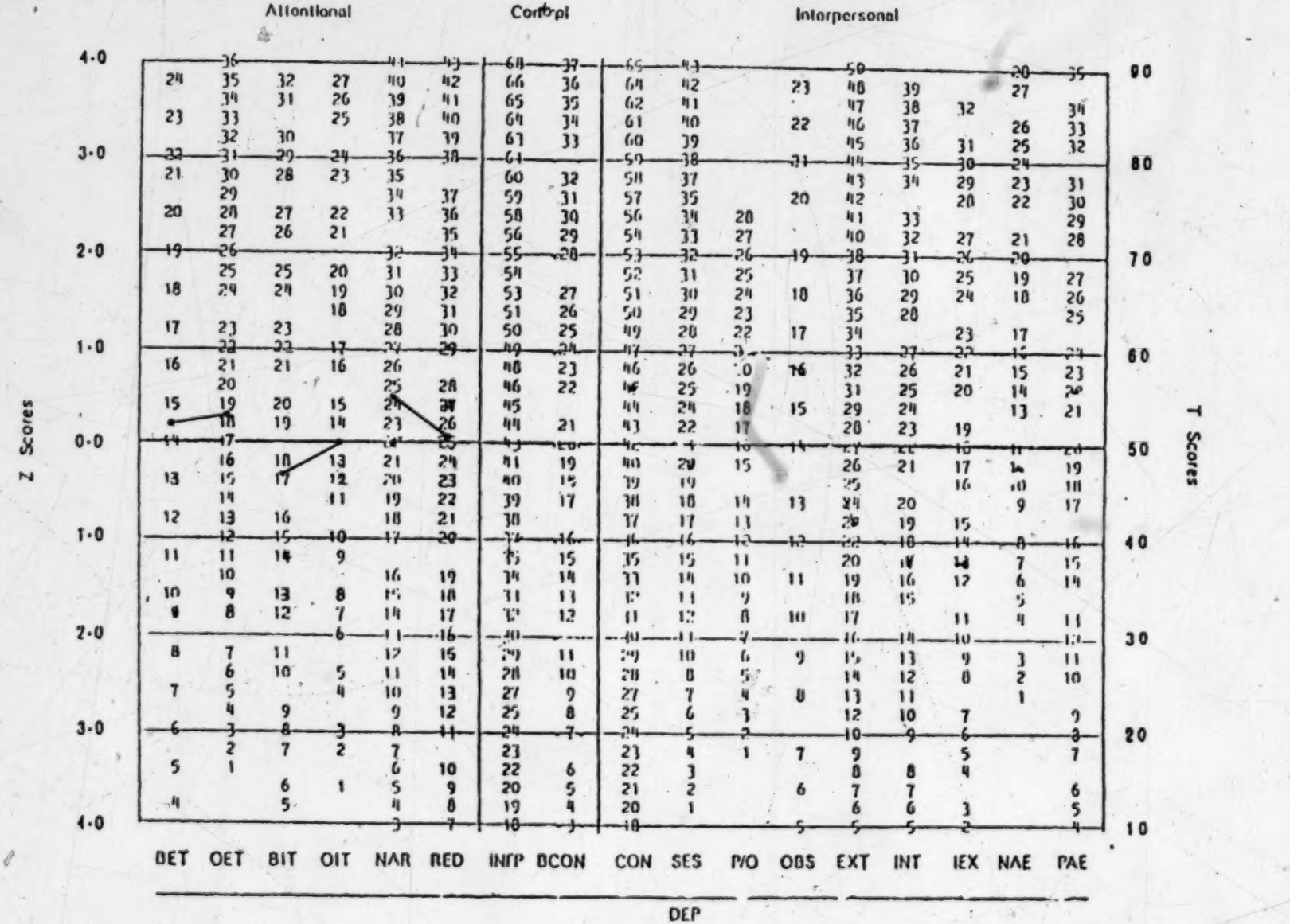
The scores on the NAR and RED scales appear to be consistent with the literature in that one would expect an athlete to score higher on the NAR scale relative to the RED scale because free-throw shooting is considered a closed skill. Nideffer (1976a) indicates that a narrow external focus is ideal in those situations where optimal performance requires total concentration on a particular point or object. "This particular attentional focus is useful when one must respond to very few

Table 1. Reliability Coefficients: TAIS Scales (n = 56)

Attentional Scale	r
BET	0.68*
OET	0.58*
BIT	0.82*
OIT	0.60*
NAR	0.74*
RED	0.72*

Note * $p < .01$

Figure 1. TAIS Scores for the Total Group



cues and if the physical behavior engaged in, once initiated, can continue without modification" (Nideffer 1976a).

The descriptive data on the total group are shown in Table 2. The free-throwing shooting percentage of the total group (i.e., 60.91%) was not particularly outstanding. This could be because the performance of every player on each team in the conference was included. Most university basketball coaches require and expect their players to perform better than 70% during a season, so this percentage was deemed inadequate. Wooden (1980) indicates that the goal of his teams were to shoot 70% or better, while Moore (1980) states that a good team free-throw percentage is closer to 80%.

Descriptive Data Specific to the Hypotheses

The hypotheses in this study were intended to explore the relationship, if any, between the scores of female basketball players on the six attentional scales of the TAIS and their free-throw shooting ability. These hypotheses were as follows:

1) High percentage free-throw shooters are more likely to score lower than low percentage free-throw shooters on the following scales:
    a) external overload scale (OET)
    b) internal overload scale (OIT)
    c) reduced attention scale (RED)
2) High percentage free-throw shooters are more likely to score higher than low percentage free-throw shooters on the following scales:
    a) broad external scale (BET)
    b) broad internal scale (BIT)
    c) narrow attention scale (NAR)

Table 2. TAIS Scores and Free-Throw Percentages for the Total Group (n = 56)

TAIS Attentional Scale	Mean	Standard Deviation
BET	14.64	2.43
OET	18.57	4.51
BIT	17.25	3.62
OIT	13.59	3.09
NAR	24.45	4.55
RED	25.36	3.93
Free-Throw Percentage	60.91	11.36

In an effort to distinguish between players who could be described as high percentage shooters and those who were low percentage shooters, it was decided to compare the top 25% of the total group with the bottom 25% of the group on the basis of free-throw shooting percentage.

The reasons for taking the top and bottom 25% was because this distribution tended to be leptokurtic; that is, a large number of cases clustered around the middle, the distribution being more peaked than a normal distribution. This indicates that fewer individual differences were discriminated by the measuring instrument, which in this case was free-throw shooting percentage. Therefore, to obtain two groups that would be significantly different in terms of their free-throw shooting performance, the top and bottom 25% were used.

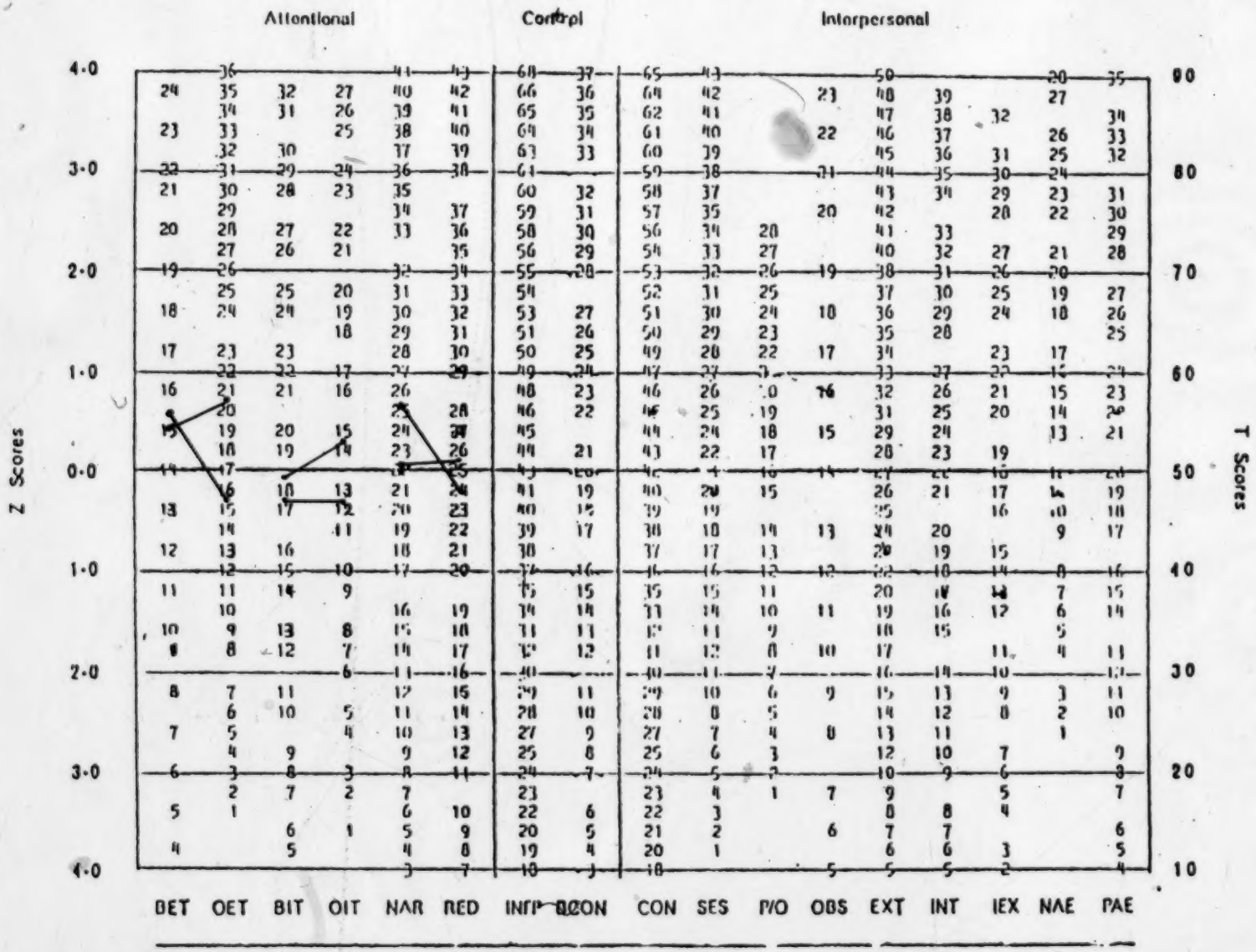
Table 3 represents the TAIS scores and free-throw shooting percentages for high and low groups. The TAIS scores for these two groups are also shown in Figure 2 on the TAIS profile sheet. A t-test between the group means on each of the six TAIS attentional scales revealed a significant difference between the two groups only on the two overload scales (i.e., OET, $p < .01$ and OIT, $p < .05$). This leads to a confirmation of hypotheses 1a and 1b and to the rejection of hypotheses 1c, 2a, 2b and 2c. Thus, only on the two overload scales is there a difference between the two groups. Such results partially support Nideffer's theory of attentional effectiveness. For a closed skill, Nideffer indicated that a narrow external focus was desirable. The higher percentage free-throw shooters tended to be more efficient in this respect, in that they displayed a more effective profile on the NAR scale relative to the RED scale (Figure 2). However, the difference between the two groups on the NAR scale was not significant.

Table 3. TAIS Scores and Free-Throw Percentages for High and Low Percentage Free-Throw Shooting Groups (n = 28)

Attentional Scale	High Percentage Free-Throw Shooters		Low Percentage Free-Throw Shooters		
	M	S.D.	M	S.D.	t
BET	15.36	2.13	15.07	3.02	0.29
OET	15.79	3.79	20.57	4.48	3.05**
BIT	17.57	3.44	18.36	4.63	0.51
OIT	12.5	2.03	14.57	3.11	2.09*
NAR	25.14	4.22	22.14	4.19	1.89
RED	24.00	4.77	25.5	4.31	0.87
Free-Throw Percentage	79.58	7.51	42.73	9.99	33.51**

** $p < .01$
* $p < .05$

Figure 2. TAIS Scores for High and Low Percentage Free-Throw Shooting Groups



Note: Blue is high percentage free-throw shooters
Red is low percentage free-throw shooters

The results obtained on the OET and OIT scale are consistent with the literature. Jones (1972) indicated that in a closed skill it is the output or effector aspect which is of primary importance; information from the external environment assumes a minor role. Thus a high percentage free-throw shooter should not become overloaded externally or internally while performing a free-throw shot. Figure 2 indicates that the low percentage free-throw shooters tended to be overloaded internally and externally and the higher percentage shooters were not.

Correlational Data

In an effort to further explore the relationship between Nideffer's attentional scales and free-throw shooting performance, an attempt was made to identify whether or not correlations between the scales and performance existed in any meaningful fashion. From Table 4 it can be seen that the OET and OIT scales were significantly related to free-throw performance which is consistent with the results in Table 3. The correlations found on the BET and BIT scales signify that no relationship exists between free-throwing shooting performance and the athlete's ability to broaden attention either externally or internally. The NAR and RED scales, although not significant, do indicate a general trend in showing a positive and negative correlation respectively.

DISCUSSION

As noted earlier, Nideffer (1976a) indicated that a narrow external focus is ideal in those situations where optimal performance required total concentration on a particular point or object. In accordance with Gentile and Marteniuk, he suggested that this particular attentional focus is useful when one must respond to very few cues and if the physical behavior, once initiated, can continue without modification. The results

Table 4. Correlation Coefficients Between TAIS Scores and Free-Throw Shooting Percentages (n = 28)

Attentional Scale	r
BET	0.08
OET	-0.55*
BIT	-0.10
OIT	-0.52*
NAR	0.24
RED	-0.21

*$p < .01$

of this study only moderately support this contention. A significant negative correlation was obtained between the OET and OIT scales and the criterion of free-throw shooting. Positive and negative correlations, although not significant, were found in the relationship between free-throw shooting and the NAR and RED scales, respectively. The BET and BIT scales had essentially zero correlations. Nideffer (1976b) reported that inconsistent swimmers were easily overloaded with external and internal stimuli when compared to consistent performers. Differences on other attentional characteristics were not found consistently. Landers, Furst and Daniels (1981) found that better shooters were less likely to be overloaded with external stimuli as well as less likely to make mistakes because they narrowed attention too much. Van Schoyck and Grasha (1981) found the subscales OET and OIT, which indicate poor concentration, were negatively associated with match play ratings of tennis players. On the other hand, the ability to maintain an appropriate focus, as evidenced by subscale NAR, was positively correlated with match play ratings. They did not consider RED in their analysis. The following discussion speculates as to why these results were obtained.

Van Schoyck and Grasha (1981) found that the attentional dimension of direction (i.e., internal and external) was not a strong component of the BET, OET, BIT and OIT scales. Rather, the bandwidth dimension seemed to dominate when subjects interpreted the TAIS items, thus attenuating the influence of the direction dimension in their response. This may be due to the fact that both bandwidth and direction are present in the same items. The results of this study suggested that the poor free-throw shooters were overloaded externally and internally but only moderately. This relationship may have been stronger if the directional dimension was more distinct within the TAIS. The relationship may have been

contaminated because of the overlap of directional and bandwidth items.

Masking of the directional dimension possibly affected the correlations on the BET and BIT scales found in this study. Assuming direction is suppressed, these scales give an indication of the individual's ability to broaden their focus. The correlations obtained on these two scales indicated essentially no relationship between free-throw shooting and a broad focus of attention. This is consistent with the stated requirements involved in free-throw shooting (i.e., attention should be narrowed). Based on these results hypothesis two may need to be modified in that one would only expect a difference between high and low percentage free-throw shooters on the NAR scale.

Van Schoyck and Grasha's results also did not support Nideffer's contention that bandwidth was a bipolar continuum. Rather, their analysis suggested that this concept was multidimensional. Drawing from the works of Watchel (1967), Silverman (1964) and Gardner et al. (1959) they proposed that there exists two facets of broad and narrow attention. One of the facets of attention is a scanning principle. This is analogous to a beam of light moving across a stimulus field. The second facet of attention involves focusing. Focus in this sense, refers to the width of a central beam. Thus, a narrowed attention can refer either to a narrow focus (reduced beam - considering only one thing at a time) or to the reduced scanning of the field. A broad attention can refer either to a broad focus (enlarged beam - considering many aspects simultaneously) or to an increased scanning of the field. These two dimensions were seen by Van Schoyck and Grasha to be related to the item content of the TAIS. BET and BIT reflected the "scanning" mechanism, while OET, OIT and NAR reflected the "focusing" mechanism.

The relationship of the TAIS scores to free-throw shooting performance was generally consistent with Van Schoyck and Grasha's interpretation of the role of the focusing factor in attention. They found subscales OET and OIT, which indicate poor concentration, negatively associated with match play ratings. The ability to maintain an appropriate focus as evidenced by subscale NAR, was positively correlated with match play ratings. A similar trend was observed in this study although the correlation on the NAR scale was not significant. Both the NAR and RED constructs may not have been significantly correlated because Nideffer failed to interpret bandwidth as multidimensional in the sense that narrow attention can refer to either a narrow focus or to a reduction in scanning. Terauds (1975), after examining the eye movement of ten male basketball players concluded that the eye movement of accurate shooters was systematic while the eye movement of inaccurate shooters was sporadic. The fixation point of accurate shooters was on the front center portion of the basket's rim. Thus, the first two conclusions provide an indication of the players' scanning procedures while the last conclusion illustrates the focusing mechanism. Nideffer does not distinguish between these forms of narrowed attention on the NAR or RED scales, rather, he tends to emphasize the focusing mechanism. If both mechanisms of attention (scanning and focusing) had been included, the scores on these scales may have been better able to distinguish between high and low percentage free-throw shooters.

The sampling distribution of free-throw shooting most likely had an effect on the results of this study. A large portion of the sample clustered around the mean free-throw shooting percentage (60.91%), making the distribution leptokurtic. Thus, the criterion measure was not able to discriminate effectively between individuals. To

compensate for this, only the top and bottom 25% of the sample was taken. This meant that the number of high and low percentage free-throw shooters was reduced. Greater numbers in these two groups may have provided a truer indication of the relationship between free-throw performance and attentional demand. It may also have been advantageous to use more than one criterion to distinguish between high and low percentage free-throw shooters. Gillespie (1965) suggests that the point spread at the time a free-throw shot is attempted during a game provides a good indication of skill level. Thus, modifications to the design of this study may be warranted.

Nideffer (1976b) recognizes the need for assessment devices to be as situation-specific as possible if a psychological variable and behavior are to be examined in a particular setting. However, he has developed an instrument, the TAIS, which largely overlooks such a requirement. The TAIS items are of a general nature, referring to common everyday situations and not specifically to a sports environment. Van Schoyck and Grasha (1981) note that "without the capacity to include relevant environmental variables, the ability to gain insight into the reciprocal processes between the athlete and his/her environment are severely limited." They also note that a sport-specific frame of reference establishes a response set that minimizes some of the response style factors which might influence answers without such a cognitive set. Thus, better results may have been obtained if a basketball specific version of the TAIS was used or the procedure involved in administering the TAIS had been modified. Nideffer (1981) notes that when possible the tester should provide the athlete with a mental set to use when answering the questions. He provides an example:

> . . . to the best of your ability I would like you to respond to the questions in terms of how they describe your behavior in athletic situations. If you can compare yourself and your responses to those of other athletes competing at your level" (Nideffer 1981).

Nideffer indicates that this instructional set would help minimize the response style differences that effect test scores and reduce their predictive utility.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to explore whether or not a relationship existed between six attentional parameters as defined by Nideffer (1976) and the free-throw shooting performance of female university basketball players. The six attentional parameters within the TAIS are designed to assess various combinations of attentional direction (internal to external) and bandwidth (broad to narrow). This includes a broad external focus (BET), overloaded external focus (OET), broad internal focus (BIT), overloaded internal focus (OIT), narrow effective focus (NAR) and underinclusive focus (RED). Nideffer suggests that certain sports require a particular combination of the direction and bandwidth dimensions for an athlete to perform adequately.

The subjects involved in this study (n = 56) were female intercollegiate basketball players in the Canada West University Athletic Association. Nideffer's "Test of Attentional and Interpersonal Style" was administered to each subject during the 1980-81 regular season. The subjects' free-throw shooting percentages for the 1980-81 regular season were used as the performance variable. High (top 25 percent in free-throw shooting distribution) and low (bottom 25 percent in free-throw shooting distribution) groups of free-throw shooters were then compared on the six TAIS attentional scales.

Adequate split-half reliability was revealed for the attentional scales of the TAIS, all coefficients being significant at the .01 level. The first hypothesis that high percentage free-throw shooters are more likely to score lower than low percentage free-throw shooters on the BET,

OIT and RED scales was partially accepted. A t-test revealed a significant difference between the two groups on the BET and BIT scales. The correlation coefficients between free-throw performance and TAIS scale scores for these two scales were also significant at the .01 level. The RED scale did not show a significant difference or a significant correlation.

The second hypothesis that high percentage free-throw shooters are more likely to score higher than low percentage free-throw shooters on the BET, BIT and NAR scales was rejected. There was no significant difference between the groups nor a significant correlation on any of these scales. The correlation coefficients on both the BET and BIT scale indicated that no relationship existed between free-throw performance and the individual's ability to broaden attention externally or internally. The correlation coefficients for both the RED and NAR scales indicated that there may have been a trend that was not clearly demonstrated in this study. Although they were not significant, both correlations were in the expected direction, NAR being positively related and RED being negatively related to free-throw performance.

Conclusions

Hypotheses number one and two were rejected but there appeared to be a relationship between performance on the closed skill of free-throw shooting and attentional parameters as defined by the TAIS. This conclusion was drawn on the basis of the following:

1) a significant negative relationship was demonstrated between the overload scales (OET and OIT) and free-throw performance.
2) a moderate positive relationship and a moderate negative relationship existed between free-throw performance and the NAR and RED constructs

respectively.

3) essentially no relationship existed between performance on the closed skill and a broad focus of attention (i.e., BET and BIT).

Recommendations

The following recommendations for further study are made after the completion of this investigation:

1) A test of attentional style should be developed for the sport of basketball using appropriate situations to represent the six attentional scales.
2) A larger sample should be secured so that the sampling distribution more closely resembles a normal distribution.
3) The information processing scale (INFP) should be included in the investigation with the six attentional scales.
4) The relationship between the six attentional scales and a different performance criterion should be examined to establish the criterion validity of the TAIS.
5) The athletes should be provided with a mental set to use when answering the TAIS questions.

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APPENDIX 1

TAIS SCALES

TAIS SCALES

BET - (Broad External focus) High scores on this scale are obtained by the individuals who describe themselves as being able to effectively integrate many external stimuli at one time.

OET - (Overloaded Externally) The higher the score, the more individuals make mistakes because they become confused and overloaded with external stimuli.

BIT - (Broad Internal focus) High scores indicate that individuals see themselves as able to effectively integrate ideas and information from several different areas. They see themselves as analytical and philosophical.

OIT - (Overloaded Internally) The higher the score, the more mistakes individuals make because they confuse themselves by thinking about too many things at once.

NAR - (Narrow Attentional focus) The higher the score, the more effective individuals see themselves with respect to being able to narrow their attention when they need to.

RED - (Reduced Attentional focus) A high score on this scale indicates that the individuals make mistakes because they narrow their attention too much.

INFP - (Information Processing) High scorers tend to process a great deal of stimulus information. Their perceptual-cognitive worlds are busy.

BCON - (Behavior Control) A high score indicates that individuals tend to be somewhat impulsive. In addition, they engage in behavior that could be considered antisocial, though not necessarily harmful.

APPENDIX 2

SAMPLE LETTER

POOR COPY
COPIE DE QUALITEE INFERIEURE

DEPARTMENT OF PHYSICAL EDUCATION
FACULTY OF PHYSICAL EDUCATION AND RECREATION

Glynis Griffiths
#4, 8805 - 111 Street
EDMONTON, Alberta T6G 1H9
Phone: 439-4382

November 12, 1980

Women's Basketball Coach
University of

Dear

I am a graduate student at the University of Alberta doing research in the area of sports psychology for my master's degree. I am currently involved in a project under the guidance of Dr. Rikk Alderman.

The main focal point in this project is the examination of Robert Nideffer's "Test of Attentional and Interpersonal Style" (TAIS). Attentional scales on the TAIS are designed to measure the attentional style of an individual; that is, the likelihood of the person entering many different situations with a particular style of attention. Knowledge of an athlete's attentional style can be very helpful to the coach and athlete.

Attentional styles of the athletes have not been looked at extensively using this instrument. I am interested in collecting attentional data on a number of athletes competing in the Canada West University Athletic Association Basketball League in order to determine the validity of this test. I would like to administer the TAIS to your basketball team. It is a paper and pencil test that takes approximately twenty minutes to fill out.

I would like to stress that I am not interested in interpreting the results of the test. The various profiles of the athletes will remain confidential and in no way will this information be used in any other manner except to establish the validity of the TAIS. If you wish to have the test interpreted I can make available to you Nideffer's "Test Interpretation".

Thank you for considering my requests.

Thank you,

Glynis Griffiths

Project Coordinator
R.B. Alderman
University of Alberta

APPENDIX 3

TEST ADMINISTRATION

TEST ADMINISTRATION

The questionnaire you are about to fill out entitled the "Test of Attentional and Interpersonal Style", is designed to measure an athlete's attentional style and interpersonal characteristics. This measurement is part of a Master's thesis study investigating the relationship between attention and free-throw shooting performance. Your team has been invited to participate in this study along with the other teams from the Canada West University Athletic Association.

It is important that you read the directions carefully and respond to each item as accurately as possible. Please fill out the information at the top of the page on the answer sheet. Please don't talk while filling out the questionnaire. Your responses on this questionnaire will be kept confidential.